### Deep representations and exploiting the structure of the data

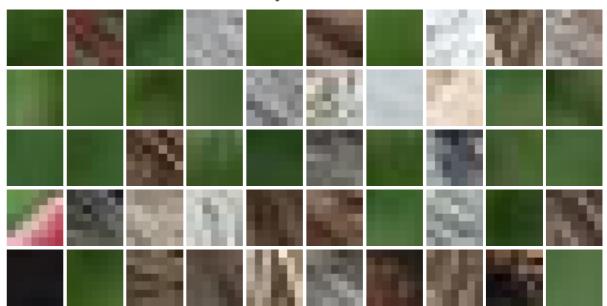
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## Structure of input data

- Images
  - Repeating patterns
  - at various scales



#### 7x7 patches



# Structure of convolutional networks

• Exploit repeating structure of images

inception\_4e unit 789 inception\_4e unit 750 inception\_5b unit 626





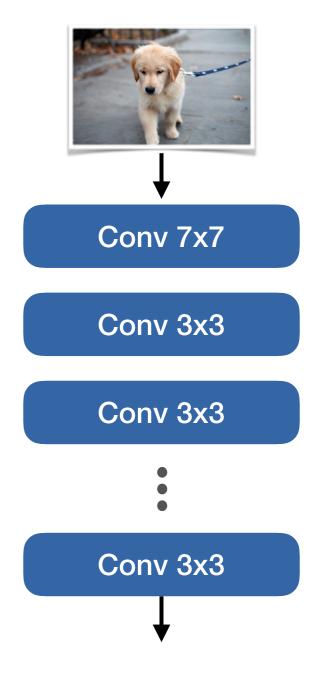
inception\_4e unit 175 inception\_4e unit 225 inception\_5b unit 415



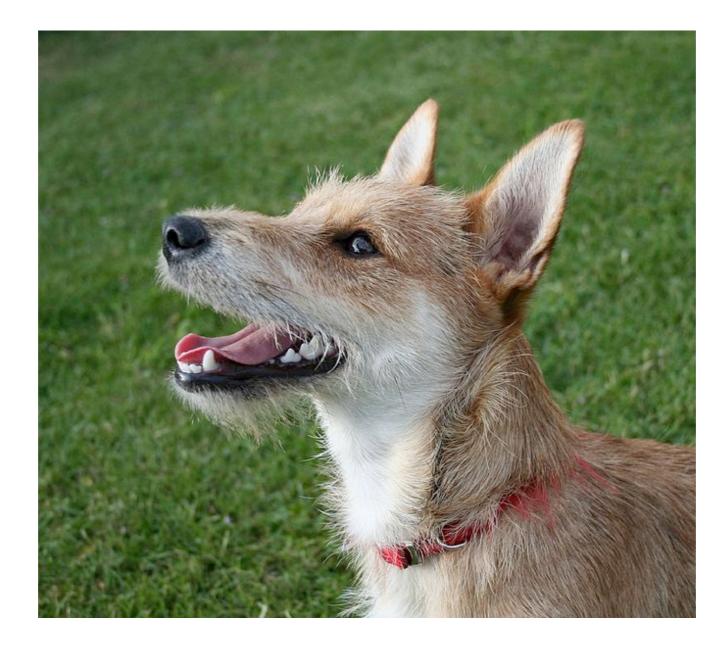




Network Dissection: Quantifying Interpretability of Deep Visual Representations, D. Bau etal, CVPR 2017

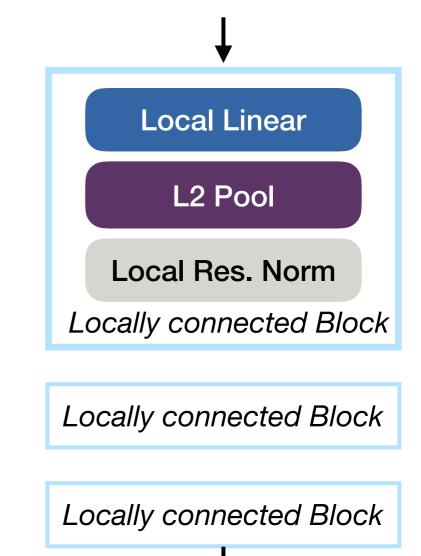


### What do networks learn?



# Linear layered networks do not work well on images

- Largest linear network for computer vision
  - Locally connected



Building high-level features using large-scale unsupervised learning, Q. Le etal, ICML 2012 Large Scale Distributed Deep Networks, J. Dean etal. NeurIPS 2012